Hurricane Lenny Recovery in the Eastern Caribbean
USAID Grant Agreement with the Organization of Eastern Caribbean States (SO # 538-007)
Grant for $5.1 million signed June 27, 2000

Special Objective Completion Report
February 2002

Project Status and Summary

The Hurricane Lenny Recovery in the Eastern Caribbean Special Objective was designed for the countries of Antigua & Barbuda, Dominica, St. Lucia and Grenada and the Grant Agreement covering the project signed with the Organization of Eastern Caribbean States on June 27, 2000. It consisted of the following intermediate results: **IR-1** Key sea defense systems and selected sections of coastal roads reconstructed – A USAID direct contract with Smith Warner International in partnership with CEP Ltd (SWI/CEP) was put in place for this IR; **IR-2** Key personnel trained in specialized areas – this component was managed under a Cooperative Agreement with the Organization of American States; **IR-3** Integrated coastal management plans developed in selected areas (Antigua and St. Lucia – USAID contracted with SWI/CEP and NOAA for this activity; and, **IR-4** Economic activities reactivated.

The Project was successfully completed on December 31, 2001. The project achieved all the objectives set out under three of the four intermediate results described in the Special Objective document. A decision was taken not to pursue the activity under the fourth intermediate result. A summary of the achievements under the project follows:

- Approximately 270 metres of sea wall and adjacent roadway was reconstructed at Gouyave in Grenada.
- Reconstruction of the intersection at Cabrits Junction including sea wall and drainage system as well as the installation rock armoring and road paving at a section of the Cabrits Access roadway, in Dominica.
- Construction of sea defense works in the villages of Gros Islet and Soufriere in St. Lucia.
- Four specialized courses were developed and conducted for persons in the public and private sectors of the region. The average course attendance for each course was 30 persons.
- Plans were developed for the NW section of Antigua as well as Gros Islet and Soufriere in St. Lucia. In addition, the project supported the installation of a GIS package and related training in the Ministry of Environment in Antigua.

Background

Hurricane Lenny was a late season storm, which reached a Category IV level. Its wind speeds reached 150 miles per hour thus making it the most powerful late November storm

on record. It affected the Lesser Antilles from November 15 – 19, 1999. Coastal communities and infrastructure were flooded, eroded and severely impacted by the high swells and surges generated by the storm. Immediately following the hurricane the US Government provided a total of $185,000 through OFDA in relief assistance. Other donors such as the CDB, UNDP, CIDA, DFID and the EU also provided temporary emergency repairs to meet immediate humanitarian and shelter needs. As part of the USG's effort to strengthen the capabilities of the worse affected countries, this Special Objective was developed.

IR-1 Key Sea Defense Systems Repaired

Final designs and construction management of the following three country sites were done by SWI/CEP, under contract with USAID/J-Car which was signed on October 20, 2000. Sites selected for construction rehabilitation were chosen by the host governments as priority sites. Sub-grant agreements were put in place with the Governments of Grenada, Dominica and St. Lucia to facilitate the use of host country contracts for rehabilitation works.

1. Grenada: Reconstruction of the sea wall (approximately 270 meters) at Gouyave was successfully completed early December 2001. A reinforced concrete wall was used to replace a 40-year-old damaged masonry wall. The rehabilitated wall was supported by the installation of rock armor placed on the sea-side to ensure adequate protection to the roadway. The roadway was widened and repaved under the project. Work was done under a contract which was signed on March 23, 2001 between the Government of Grenada (GOG) and Trinidad Contractors Ltd. for $1.74 million. USAID funded $1.3 million of this amount with the GOG funding the balance.

Following the commencement of work, the project experienced significant delays due to rain, resulting in the late completion of most work items. The contractor's overall performance was creditable. One of the features on their work process was the use of prefabricated sections of the wall that was constructed at their base in Trinidad. The use of this technique ensured that the rate of construction was high during the dry periods. Before and after pictures of the site are shown below:

Gouyave sea-wall before rehabilitation taken in June 2000

Rehabilitated Gouyave sea-wall and access road taken in December 2001

2. Dominica: The project in Dominica included the reconstruction of the Cabrits Junction and the protection of critical sections of the Cabrits Access road and was completed by December 31, 2001. The replacement of a reinforced concrete sea-wall at the Junction with rock armor placed on the sea-side of the wall was done. A new drainage system was put in place to handle storm water run-off and a new traffic island was installed at the Junction. At the Cabrits Access roadway, which leads to the cruise shipping pier, rock armor was placed at sections of the roadway, which were deemed vulnerable to disasters. Paving of the road was also done under the contract. Work was carried out under a Contract signed May 2, 2001 between the Government of Dominica and Edgehill & Associates for $1.04 million. The quality of work by the contractor was of a high standard. The Project was fully funded by USAID. Pictures of the work site are shown below.

Sections of the damaged road protection sea-wall in Cabrits – Dominica

Rehabilitated sections of the Cabrits Junction & Access taken December 2001

3. St. Lucia: Two construction contracts were funded in St. Lucia (i) shoreline enhancement and sea defense works in Gros Islet, including the installation of adequate drainage on the beachfront, as well as, the placement of buried revetment at two sites at sea, and (ii) shoreline enhancement and sea defense works in Soufriere which included the installation of sea-wall and rock armor, drainage culverts, paving of the roadway, enhancement works to the wetlands and the construction of a small tender pier.

The Government of St. Lucia (GOL) committed $600,000 to match USAID's $1,320,000 into the overall project. USAID's funded activities were completed at both sites by December 31, 2001. Remaining activities at both sites, which will be completed by the middle of March, are being funded by the GOL. The GOL will be continuing the development of the Gros Islet area using their funds and this includes the installation of a boardwalk placed over the drain on the beachfront, as well as providing assistance to building owners to upgrade the façade of their buildings.

Gros Islet:

A contract was signed August 13, 2001 between the GOL and C. O. Williams Construction Company Limited for $768,709 of which USAID funded $578,440. The project site was shut down on December 12, 2001 due to the unavailability of suitable rock to complete one remaining buried revetment. Additional rock was imported to facilitate completion of one buried revetment by February 28, 2002. This latter phase of works is being funded by the GOG. The contractor's overall performance was satisfactory.

Drain on beachfront in Gros Islet

Buried revetment in Gros Islet

Soufriere:
A contract was signed on August 10, 2001 between the GOL and Dipcon Engineering Services Ltd. for $1,166,677 of which USAID funded $741,560. The project was 66% completed as of December 31, 2001 with USAID covering 64% of the overall work completed. The remaining items of work to complete the project which includes the paving of the road and the completion of the small tender pier is being funded by the GOL for completion by the end of March. The contractor's performance overall was average but slower than expected due largely to a higher than normal use of sub-contractors.

Unprotected beachfront – Soufriere

Rock armor in place - Soufriere

IR 2: Key Personnel Trained in Specialized Areas

The Organization of American States (OAS) under a Cooperative Agreement with USAID, managed the training program in specialized coastal related courses. The Engineering Institute and the Department Civil Engineering, Faculty of Engineering at the University of the West Indies in Trinidad were contracted by the OAS as the primary entity to organize and deliver the training courses. The Coastal Engineering Centre of the Old Dominion University in Norfolk, Virginia, and the Coastal and Hydraulic Laboratory of the U. S. Army of Corps of Engineers were brought in to design and host the training program. This activity was completed on September 28, 2001. A summary of the details of the course follows: **Course 1** *Coastal Zone Management* held in Antigua on June 18-22, 2001 and in St. Lucia on July 2-6, 2001. Thirty-eight persons attended this course; **Course 2.1** *Coastal Defense Systems I* in St. Lucia on July 16-20, 2001and **Course 2.2** *Coastal Defense Systems II* in Dominica on July 30 to August 3, 2001. Thirty persons attended this course; **Course 3** *Monitoring and Maintenance of Coastal Infrastructure* in Grenada on September 10-13, 2001. Twenty-four persons attended this course. **Course 4** *Design of Marine Structures* in Trinidad/Tobago on September 24-28, 2001. Thirty-one persons attended this course.

IR 3: Coastal Zone Management Plans For Selected Areas

SWI/CEP completed and submitted the final coastal zone management plans for Gros Islet and Soufriere. The documents were developed with inputs from various public agencies in St. Lucia.

NOAA completed and submitted to the Government of Antigua (GOA), the final coastal zone management plan for NW Antigua. The plan in draft form was reviewed by the GOA and comments inputted into the final document. Training of key personnel and the installation of a GIS computer system were also done under the contract with NOAA.

IR 4: Economic Activities Reactivated

Funds previously under this component were reallocated to IR 1 following the lack of success in identifying suitable entities for assistance under this component.

Project Management

The project management structure and the use of host countries contracts worked very well in ensuring that the goals were achieved under the project. The management structure of one USAID Project Manager (Jamaica based) supported by a USAID contracted Engineer with previous in-house USAID experience, and who is based in Grenada, worked very well in covering the four countries adequately.

The use of host country contracts proved to be the correct method of implementation for the construction contracts. All relevant host government ministries were responsive to the overall demands of the project as well as USAID's requirements.

Using the firm SWI/CEP proved successful, as SWI is one of the foremost coastal engineering design firms in the region. They were supported by CEP, which though based in Barbados, had satellite offices in other countries thereby providing adequate coverage for all projects. The construction firms of Trinidad Contractors Limited from Trinidad, Edgehill & Associates from Barbados and C. O. Williams Limited performed creditably and therefore are recommended for consideration for future contracts. The firm of Dipcon Engineering Limited should not be considered for any future USAID funded projects based upon their recent below average performance.

Both SWI/CEP and NOAA performed creditably in the production of the relevant Integrated Coastal Management Plans.

Lessons Learnt/Proposed Future Activities

Assistance provided to rehabilitate physical structures was considered well spent in the areas chosen. Disasters will always be with us, and these small economies will always seek assistance in such times. It is therefore necessary that such countries take steps to ensure that persons are adequately trained and retained to ensure that facilities are maintained, designed or constructed to withstand natural disasters of a designated standard. In order to support the building of institutional capacity it recommended that support be given to the primary engineering institution in the region, the University of the West Indies' Faculty of Engineering. The Faculty is currently developing a two-year project using some of the results gained from the Hurricane Lenny Project to address this issue. The proposed activities include:

1. Expand the Building of Expertise and Institutional Capacity

a) Building of academic capacity in coastal engineering at UWI. This would entail establishing formal arrangements with universities and specialized institutions such as ODU and the (CHL) of the U.S. Army Corps of Engineers, to facilitate exchanges of personnel for short working visits, including students and young professionals; collaboration in the use of laboratory services; assistance with coastal data collection and research addressing critical coastal management issues in the Caribbean; and collaboration in the preparation of academic and technical publications.

b) Design and implementation of a follow-on training program. This program would address the needs and gaps identified by the participant and teachers involved in the recently completed 5 course training program. It would be implemented by the same institutional partnership, and would be structured so that it would maximize opportunities for further capacity building at UWI.

c) Organizing an annual Caribbean Coastal Management Workshop/Conference. The conference would offer an opportunity for coastal engineers in the islands to present lessons learned and to exchange experiences in the implementation of island specific plans and projects. In addition, the conference would offer a forum to address development policy issues involved in CZM, and would make a significant contribution to creating awareness of coastal issues among policy makers in the region.

d) Developing a web-based network linking academic and specialized institutions with practicing coastal engineers and managers. The purpose of this web site is to support and facilitate the exchange of information and access to expertise relevant to coastal engineering and coastal zone management in the region and outside.

2. Develop Regional Tools for Data Management and Analysis

a) Promote the full utilization of the Coastal Resources Inventory System (CRIS), developed under the CPACC project and installed in 12 English speaking Caribbean countries. CPACC (Caribbean Planning for Adaptation to Global Climate Change) is a four year project funded by the Global Environment Facility. Identifying and reducing coastal vulnerability through capacity building in coastal management is an important component of the project

b) Support the development of regional scale advanced coastal processes modeling. Such modeling is essential to improve the understanding of coastal processes typical to Caribbean islands. Included in this activity will be the validation of the TAOS tropical storm modeling system with actual observations from the region. The TAOS modeling system is being used by various institutions in the Caribbean to produce coastal hazard assessments and information of relevance to coastal design and coastal zone management.

c) Contribute to the maintenance and improvement of the coastal climate, sea-level and beach monitoring networks installed by CPACC and COSALC. These two project, and several others, have produced information and introduced practices aimed at improving coastal zone management and engineering. The UWI program, with its focus on networking and capacity building, could play an essential role in linking and integrating the various ongoing initiatives in climate observation and beach monitoring.

d) Facilitate the production of and access to bathymetric survey data. The region needs a mechanism that maintains an up to date inventory of bathymetric data for critical coastal areas, and that coordinates further investments in obtaining such data.

3. Assist in the Development of National Implementation Plans

(a) Update the CRIS and the national GIS systems with recent coastal information.
(b) Identify critical and at risk locations, develop monitoring strategy.
(c) Develop and implement, on a pilot basis, an Island Coastal Management Plan (to include partnering with the private sector, monitoring process for tracking and reporting benefits, strategy for sustaining implementation)
(d) Disseminate the methodology and results of the pilot through training workshops.

Anticipated Outcomes of the above initiatives:

(a) A coastal engineering track in the Engineering Department of the University of the West Indies.
(b) A Coastal Engineering web site maintained by the Faculty of Engineering at UWI, supporting access to relevant information, exchange of experiences, and networking among practicing engineers in the region, and with outside experts.
(c) A measurably improved capacity in ministries of public works, coastal zone units and planning departments, and in the private sector, to undertake design, construction and maintenance of coastal infrastructure, and to manage coastal areas.

APPENDIX 1

Financial Summary

The following table summarizes the financial status of the project at December 31, 2001.

Program Element	Revised Budget/$	Expended/Accrued/$
IR 1 Sea defenses repaired	4,259,952	4,255,922*
IR 2 Specialized Training	550,000	550,000
IR 3 ICMP	191,500	191,500
IR 4 Economic activities reactivated	0	0
USAID Project Management	98,548	66,005
TOTAL	**5,100,000**	**5,063,427**

*Figure includes an amount of $168,800 over that recorded by MACS and represents amounts under accrued in December.

LIST OF INSTRUMENTS AND REPORTS

Grant between the United States Agency for International Development and the Organization of Eastern Caribbean States
Sub Grant Agreement between the United States Agency for International Development and the Government of Grenada
Sub Grant Agreement between the United States Agency for International Development and the Government of Dominica
Grant Agreement between the United States Agency for International Development and the Government of St. Lucia
Contract between the United States Agency for International Development and Smith Warner International in partnership with CEP Ltd.
Cooperative Grant Agreement between the United States Agency for International Development and the Organization of American States
Contract between USAID/W and NOAA

Monthly progress reports
Quarterly progress reports
Reports for R4 purposes (2)

LIST OF CONTACTS

Dr. David Smith
Smith Warner International
Unit 2
Seymour Place
Old Hope Road
Kingston 5
Jamaica
Ph. 876-987-8950

Mr. Jan Vermeiren
Unit for Sustainable Development
The Organization of American States
Washington D.C.
Ph. 869-465-1018

Dr. Clement Lewsey
NOAA
Washington D.C.

Mr. Raymond Charles
Head of the Faculty of Engineering
University of the West Indies
St. Augustine
Trinidad
Ph. 868-662-2002